

## CLAIMS

1. A method of growing a semiconductor layer structure, the  
5 method comprising the steps of:

growing a first (Al<sub>x</sub>Ga<sub>1-x</sub>)N layer over a substrate at  
the first substrate temperature by MBE using ammonia as the  
nitrogen precursor;

10 cooling the substrate to a second substrate  
temperature lower than the first substrate temperature, while  
maintaining the supply of ammonia to the substrate;

growing an (In<sub>x</sub>Ga<sub>1-x</sub>)N quantum well structure over the  
first (Al<sub>x</sub>Ga<sub>1-x</sub>)N layer by MBE using ammonia as the nitrogen  
precursor;

15 heating the substrate to a third substrate  
temperature higher than the second substrate temperature,  
while maintaining the supply of ammonia to the substrate;  
and

20 growing a second (Al<sub>x</sub>Ga<sub>1-x</sub>)N layer over the quantum well  
structure at the third substrate temperature by MBE using  
ammonia as the nitrogen precursor.

2. A method as claimed in claim 1 wherein the first (Al<sub>x</sub>Ga<sub>1-x</sub>)N  
layer has a first conductivity type.

3. A method as claimed in claim 2 wherein the second (Al<sub>x</sub>Ga<sub>1-x</sub>)N layer has a second conductivity type different from the first conductivity type.

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4. A method as claimed in claim 3 wherein the first (Al<sub>x</sub>Ga<sub>1-x</sub>)N layer is doped n-type and the second (Al<sub>x</sub>Ga<sub>1-x</sub>)N layer is doped p-type.

10 5. A method as claimed in any preceding claim wherein the first substrate temperature is within the range 850°C to 1050°C.

15 6. A method as claimed in any preceding claim wherein the second substrate temperature is within the range 650°C to 1000°C.

20 7. A method as claimed in any preceding claim wherein the third substrate temperature is within the range 850°C to 1050°C.

8. A semiconductor layer structure grown by a method as defined in any of claims 1 to 7.

9. A semiconductor light-emitting device comprising a semiconductor layer structure grown by a method as defined in any of claims 1 to 7.

5 10. A semiconductor device as claimed in claim 9 wherein the device is a light-emitting diode.